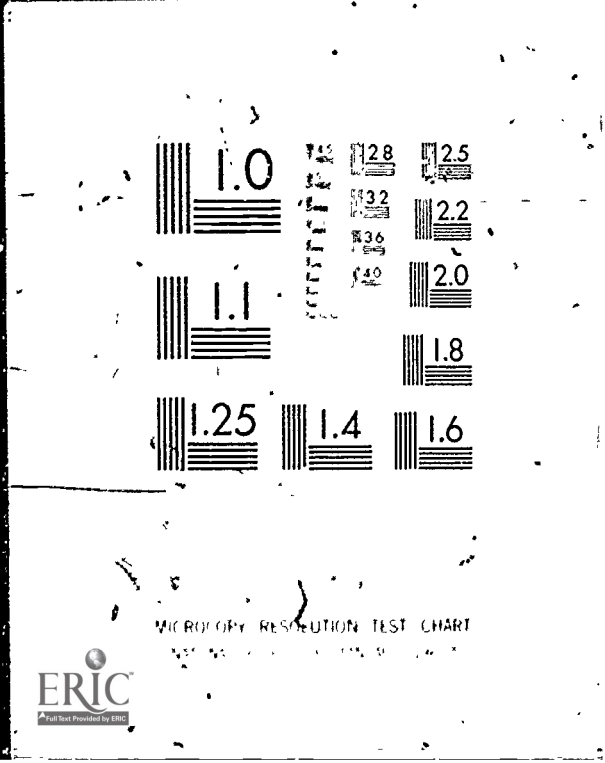

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ABSTRACT

This paper describes a model of field-centered competency-based education utilizing multidisciplinary methodology and individualized instruction. Although the model was developed as part of an administrative preparation program for special education administrators, it is a general model with potential for wider application. The model uses a multidisciplinary approach employing goal analysis, job analysis, and an anthropological study to develop instructional and assessment objectives. Assessment in the model involves domain-referenced pretesting and posttesting and simulations of actual field conditions. Besides discussing examples of specific program procedures and implementation, the authors employ a systems approach to clarify the model's basic phases and components. (Author/JG)

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Washington, D.C.

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A FIELD CENTERED COMPETENCY BASED EDUCATION MODEL*

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List of Illustrations

This paper is directed at those persons interested in the manner in which a program may be developed using a field centered, competency based, education model or who might wish to consider adapting some of the essential features of the model to other instructional programs. The model was developed originally for the preparation of administrators under funding from the United States Office of Education and the Bureau of Education for the Handicapped.

A systems approach will be used to clarify the basic phases or components involved in program development which will be discussed along with examples of specific program procedures and instrumentation. The modeling language used to illustrate the model was developed by Silvern (1972) and shows the flow of information through the system. Systems models of this type are intentionally developed at a general level and never change their major elements and relationships during implementation. Focus on inputs, activities, and outputs has the advantage of being relatively independent of content; and a program stated in systems terms can be more readily adapted to any field in which similar conditions obtain initially (i.e. where performance can be observed).

Overview

In its most general form a field centered, competency based, education model is relatively straightforward and has many features in common with other competency based education models. Its characteristics, corollaries and assumptions are presented in outline form in Table 1.

The basis for evaluation of a program developed using the model is each individual's learning and performance. A primary premise of this model is that there is a direct relationship between training offered and methods of evaluation. However, no attempt is made to show the effects of such a

preparation program on student (child) or client performance. One reason is that the effect of staff development on children's progress still is not clear and is a topic that generates considerable controversy within competency based teacher education. Further, there is little reason to believe that a direct result of administrator preparation will be seen through improvement in child learning even though pupil growth is the purpose of all school-related activities.

Insert Table 1 here

Figure 1 indicates the sequence of developmental activities. First, the position or group of persons for whom an educational program is to be developed is specific and its characteristics and training needs are described. Second, the competencies which persons in that position should obtain are identified, based on characteristics of the position itself. Preparation of instruction and development of an assessment system proceed concurrently since these two activities are interdependent. However, as the feedback arrows indicate, assessment affects the instruction component of the model. With the possible exception of initial designation of the population to be trained, development and modification of the training program are based upon objective data to a larger degree than is usual (Heath and Nielson, 1974); and most data management is computer based.

Insert Figure 1 here

Table 2 provides a further overview of the model by listing major program development questions to be answered for each component of the model. Satisfactory decisions in response to each question may be considered to be the

Table 1

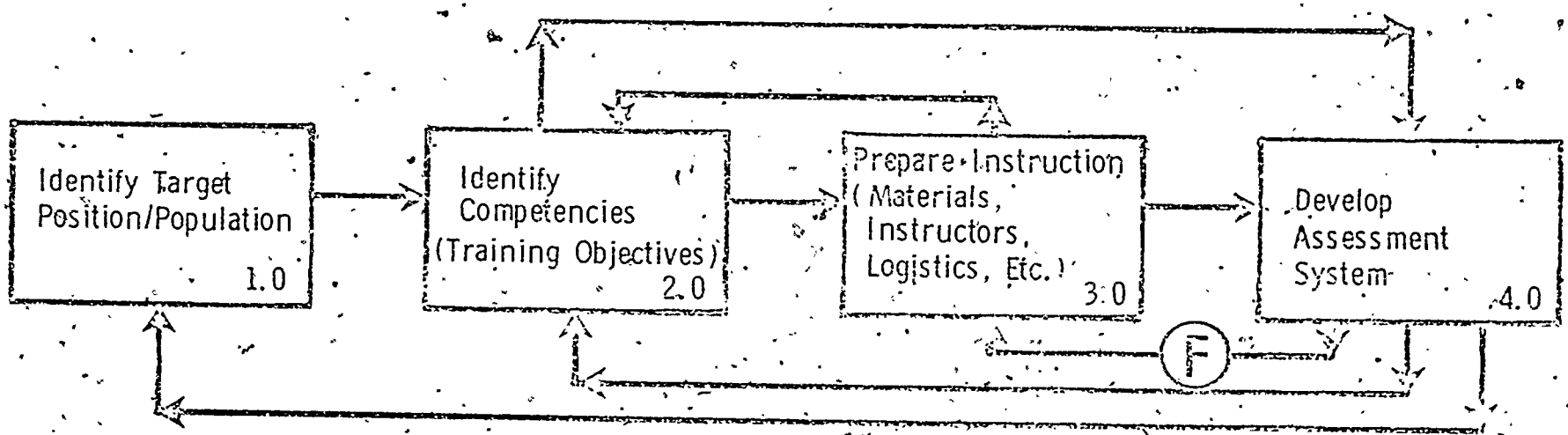
Field Centered, Competency Based Model

for Program Development Characteristics

Characteristics	Corollaries	Assumptions
1. Goals of the training program are stated as competencies or performances		Relevant goals can be identified and so stated
2. Performances are derived empirically from job	Training content and performance criteria will change over time as does job	This is a reasonable preparation base
3. Core of minimum essential competencies will be taught	Other performances may be desired for specific positions	Those skills can be agreed upon. Persons with these core skills can function in entry level positions
4. Instruction is based on individual needs	Amount and content will vary. Rate of progress will vary	Varying levels of prior training, experience, and ability
5. Instruction is field-centered		Continuing education for employed persons. Location is appropriate to the training to be offered
6. Kinds of instruction taught--facts, concepts and skills	Evaluate by demonstrated retention of information and performance (Actual of simulated) of skills	Person can be successful in job if he/she has those skills and that knowledge
7. Evaluate training program by student learning and performance		There is that direct relationship. Can't show effects on child, student, or client performance

Figure 1

Overview of Training Model in Sequence



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goals of that component. Table 2 also lists data sources that can provide bases upon which program managers may make rational decisions.

Insert Table 2 here

Needs Assessment

The first program development task represented in Figure 1 as component 1.0 is to identify the target position, to estimate the extent of need for training within this target population and to describe the population.

For some education programs, surveys of needs for preparation programs may tend to be bypassed due to legislative mandate or other external directives. For other programs there must either be demonstration of the training to secure funding or incorporation of the program as an ongoing function of University self-examination and renewal processes.

Adoption of a competency based approach implies that definitions of need for preparation programs are derived from a description of the population to be trained. Although obviously desirable, internal consensus among faculty is not regarded in the model as sufficient to establish needs without supporting documentation obtained from the field. Information gained from the initial planning phase is useful in delimiting the content and determining organization of instruction.

The model under consideration in this paper was developed and implemented over a period of 18 months as a component of a project funded by the United States Bureau of Education for the Handicapped to train administrators for special education programs using a field centered approach. Using that particular application of the model as an example, the following steps were taken.

A number of previously available sources of information were used to delineate the population to be educated. A review of the literature yielded

Table 2

Field Centered, Competency Based Education Model

Component	Major Questions (Goals)	Sources of Information
1.0 Identify target population/position	Is there a need for training ? Who should be trained ? How can these persons be described ?	Legislative (or other) mandates or preferences Literature in the field Requests made to training institution Needs assessment (e.g., demand personnel, present training levels of possible target populations) Data from prior training
2.0 Identify competencies	What do position incumbents have to do ? What do they need to know in order to perform adequately ?	Goal analysis Job analysis Anthropological field study Data from prior training
3.0 Prepare instruction (materials, instructors, logistics, etc.)	How should content be limited ? How should instruction be organized (service delivery) ? What materials/strategies for learning are available or need to be developed ? Who should provide instruction ? What instructional components or other factors influence probability of reaching training objectives ?	Judgements of professionals in the field, instructors, and participants Literature in the field Data from prior training
4.0 Develop assessment system	What courses should participants take ? What changes in competencies occur during and after instruction ?	Pre and post domain-referenced testing Pre and post performance assessment Performance on course materials exercises Data from prior training

summaries of the typical preparation and experience background of Minnesota special education directors (e.g. Spriggs, 1972; Bilyeu, 1973; and Wedl, 1973) which, along with a review of presently available educational opportunities, suggested that priority be given to expanded and improved preparation in administrative skills for present incumbents of these positions. As the model is implemented, data from prior training efforts provide additional sources of information regarding the target population to be trained.

Other programs may wish to use similar means or may rely on such strategies as demographic studies, internal and field surveys, or Delphi probes.

Competency Identification

A second component of the program model is the process by which competencies or desired performances are identified. A multidisciplinary approach is used employing three strategies (goal analysis, job analysis, and an anthropological field study) which are used to cross-validate each other. Each of these strategies has previously been used alone as the basis for performance specifications. Together such strategies present a reliable and more valid description of the minimum essential performances for a particular position, especially when viewed from the extent to which these strategies duplicate each other.

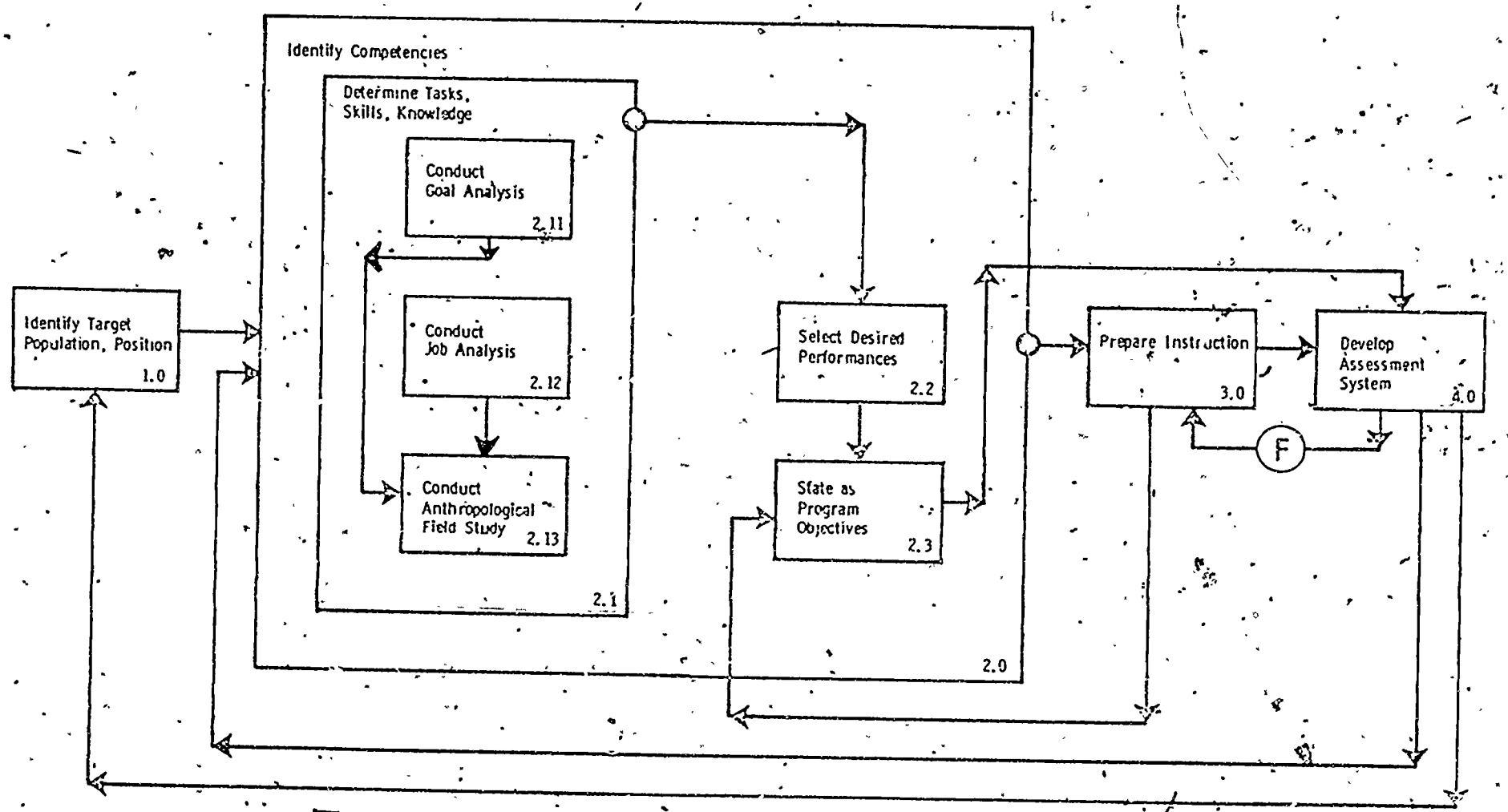
The specification of competencies or performance criteria is illustrated in Figure 2 and each of the techniques employed is described below.

Insert Figure 2 here

Goal analysis. Goal analysis is Mager's (1972) procedure for obtaining consensus among a group of people and includes the following steps: First, a panel is selected, descriptive words and phrases are elicited from each panel member, and all responses are recorded. The panel then meets to edit

Figure 2

Development of Competencies and Performance Criteria



the list. Members eliminate duplication and non-essential items, fill in deficient areas, and rewrite the list in performance terms. The group then rates each item for desired level of performance, specifies the importance or centrality of achievement at the task, and agrees to the accuracy of the resulting material after it has been edited into correct statements of behavioral objectives.

Goal analysis provides the general statement of performance which, when combined with the specific skills, tasks and knowledge from the position (job) analysis, allows relevant, behaviorally stated objectives to be developed for the position being studied. Crucial to effective goal analysis is the composition of the panel. In the case of the first application of the model, the special education administrator's job functions (as determined by literature review) were divided into three parts--fiscal management, personnel management, and special education program development--and separate panels were convened for each function. This action permitted selection of specialists in specific areas to participate as panel members without making each group unduly large. Each panel included representatives from local school districts, regional consultants, State Department of Education staff, and professors of educational administration and special education.

Job analysis. Job analysis, the second strategy, uses a set of procedures derived from industrial psychology for careful study of a job within an organization. It has been defined by the United States Bureau of Employment Security (1965):

> The process of identifying, by observation, interview and study, and of reporting the significant worker activities and requirements and the technical and environmental facts of a specific job. It is the identification of the tasks which comprise the job and of the skills, knowledges, abilities, and responsibilities that are required of the worker for successful performance and that differentiate the job from all others (p. 5).

A number of different methods may be employed for conducting a job analysis. These include questionnaires and checklists, observation, individual or group interviews, logbooks, or judgments about good and poor job performance.

Continuing to use the example of the Special Education Administration Training Program, several studies of special education administrators used analysis of existing job descriptions and self-reporting by questionnaires sent to directors. These job analysis procedures were supplemented by direct observation and structured interviews with a small stratified sample of the population. Tasks, skills, and knowledge reported by any of these means were summarized, distributed to all directors for comments, and modified as needed. The resulting position description is contained in the final report of that job analysis (Harpaz, 1974).

Specificity and inclusiveness characterized the differences between results of goal analysis and those of job analysis. Results of the job analysis included a lengthy enumeration of all the specific tasks which every Minnesota director performed. On the other hand, goal analysis included judgments of centrality or importance of more "global" performances and may have omitted some tasks entirely. The two procedures were used to check each other and to produce a more accurate description.

Anthropological field study. Data from anthropological study are intended to improve further the validity of performance specification by identifying minimum essential performances which substantiate those previously identified or which may have been earlier overlooked in the goal analysis and job analysis. This approach tends to produce data not readily available from other sources, such as the annual cycle of activities of a position holder, information sources, and decision making processes. Such an activity

documents the vast numbers and types of community and state agencies and administrators and staff with whom the director communicates both routinely and occasionally. It also assesses the influences of different organizational structures upon the role of the position holder.

An anthropological study utilized ethnographic techniques and systems analysis. Participant observation in the form of participant-as-observer (as used by Harry Wolcott in his 1973 study of an elementary principal) provides the methodological base, supplemented and cross checked by several other methodologies, present and past logs kept by position holder, time study, interviews, information on the position holder's calendar, and drawing of decision-trees. For the first application of the model, each of three position holders in three representative communities (urban, rural and rural-urban), representing three different types of administrative units (single school district, cooperative in an Educational Service Area and cooperative not in an Educational Service Area) were studied one week each month for one year.

Data from such anthropological study have multiple uses. The study should be begun well in advance of program implementation to be used in conjunction with the goal analysis and job analysis for initial competency specification. If carried out concurrently with instructional program activities, such study serves to refine or modify initial performance statements. In either case anthropological data are useful in setting up a framework within which simulations, course exercises, or test questions can be devised.

Revalidation of competencies. It is recognized that position requirements have a tendency to change over time. In most positions job requirements and competencies will not show substantial differences over time spans of

less than three years. Consequently, the model repeats at three year intervals those goal analysis and job analysis procedures to revalidate performance specification as duties and competencies change. The anthrological study will also be repeated.

Preparation of Instruction

Chronologically, components 3.0 (Prepare instruction) and 4.0 (Develop assessment procedure) are concurrent procedures, and both should begin as soon as initial competencies have been identified tentatively. Indeed, the nature of the interrelationships between these two tasks suggests that development of performance measures might precede curriculum and other instructional preparation.

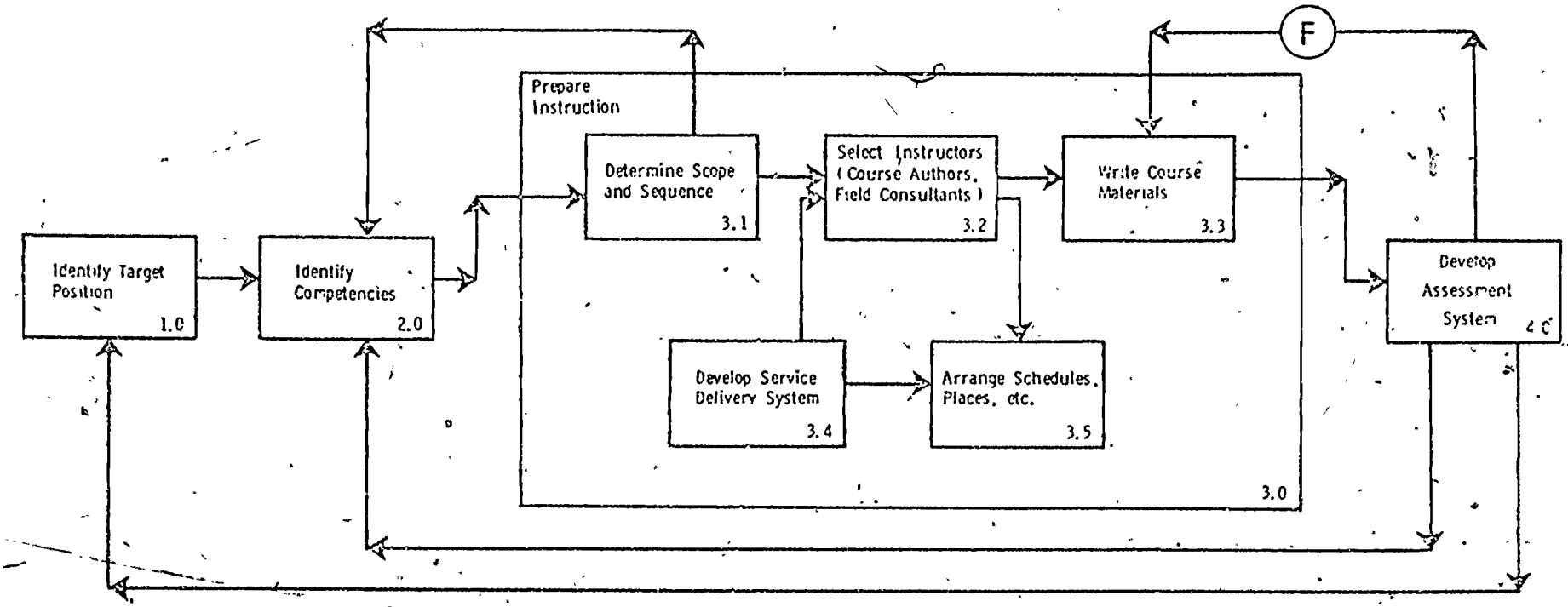
As may be seen in Figure 3, preparation of instruction begins by delimiting the curriculum in view of priorities established in the goal analysis, job analysis and anthropological study, available information on present competency levels of the target population (such as preliminary assessment results), and pragmatic considerations such as time, extent of funding, and other resources. Once the scope and sequence have been determined, course preparation begins by selection of course authors who are specialists in specific content areas. These persons are provided with course objectives (the outcome of the competency identification process) and with questions from the domain referenced test which pertain to those objectives when available.

Insert Figure 3 here

As may be noted from Figure 4, during the developmental phases course authors are responsible for selecting and/or writing appropriate reading

Figure 3

Overview of Model Detailing Preparation of Instruction Sequence



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materials and for preparing exercises on each phase of the content area to give participants an opportunity to practice the skills being taught and to apply concepts which have been presented. Course authors also have a continuing function. During the operation of training, they evaluate performance on the course exercises and thus provide participants with feedback on the extent to which concepts and skills have been mastered.

Insert Figure 4 here

Parallel to the development of curriculum and materials is development of the service delivery system. Needs assessment data on the population to be trained and known parameters of the content of training provide some clues to delivery requirements which must be met and needed resources.

Assessment

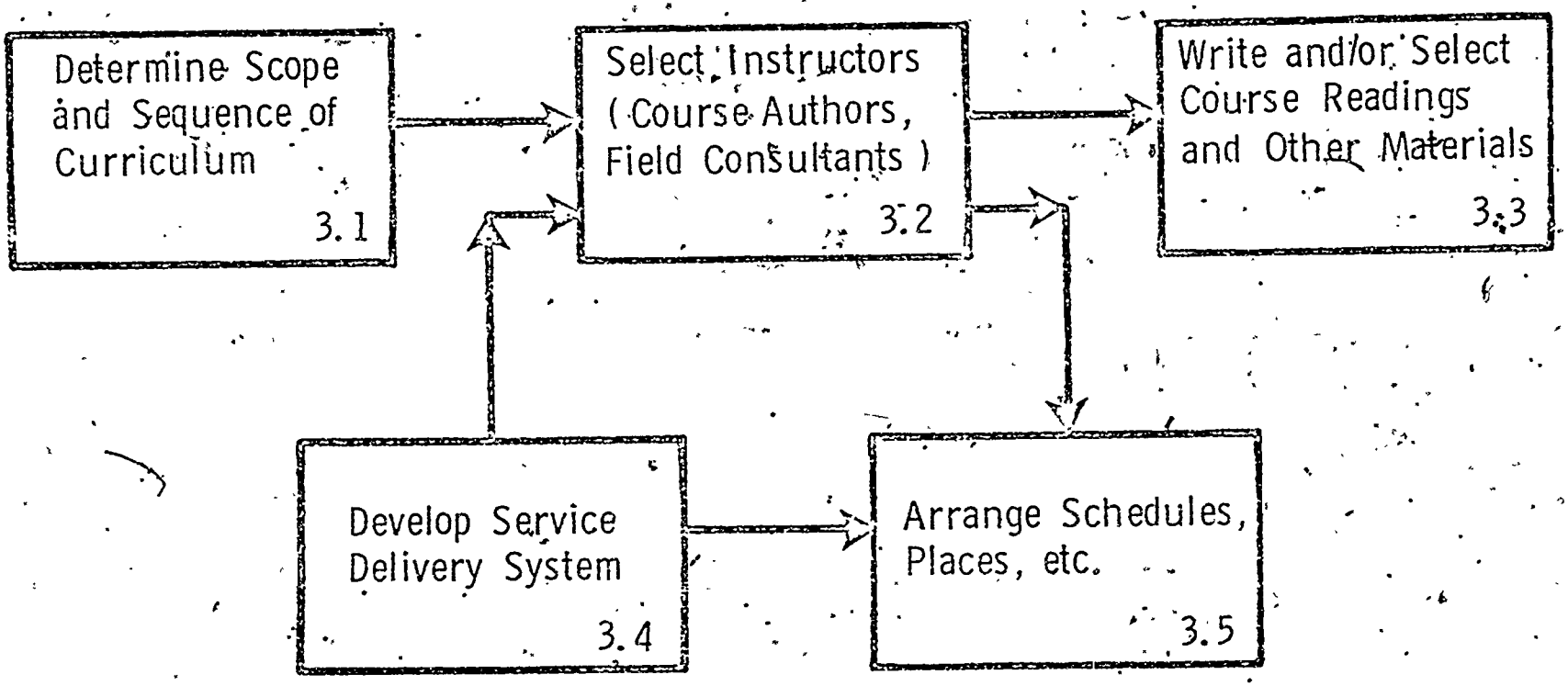
The fourth component of the development model is one of its most important features. As a competency or performance based program, the field centered competency based education model is by definition a data-based system:

> Assessment lies at the heart of PBTE. Goals of instruction must be stated in assessable terms; learner performance must be assessed and reassessed throughout the instructional process; evidence so obtained must be used to evaluate the accomplishments of the learner and the efficacy of the system. Remove assessment from PBTE and all that is left is an enumeration of goals and provision of instruction which hopefully will lead to their attainment--not much on which to pin one's hopes for significant improvement in an educational program (AACTE, 1974, p. 18).

The model's emphasis on assessment serves two major purposes. First, it enables program managers to determine on an ongoing basis the extent to which participants achieve the program objectives at criterion levels. Second, it permits objective determination of the appropriateness of instructional methods, content of instruction, and established criterion levels for achievement.

Figure 4

Preparation of Instruction Sequence



The model focuses on those competencies necessary for performance on the job and, thus, employs two basic strategies to determine the extent to which these competencies are attained. First, performance assessment uses simulations of actual tasks which all position holders must be able to perform. Second, cognitive assessment measures of the knowledge which each participant must have in order to perform essential job tasks. Both measures are obtained on a pre and post test basis.

Other data are less formal and are collected at various points prior to, during, and following instruction. Such data include information regarding participants' perceptions of their competencies and the training they are receiving, results of course exercises completed in the field, and reactions of field consultants in a position to observe participants' work.

Complete descriptions of all instruments, subjective and objective data collection procedures, and methods of analysis for the first application of the model may be found in the project's evaluation design (Deno, 1974).

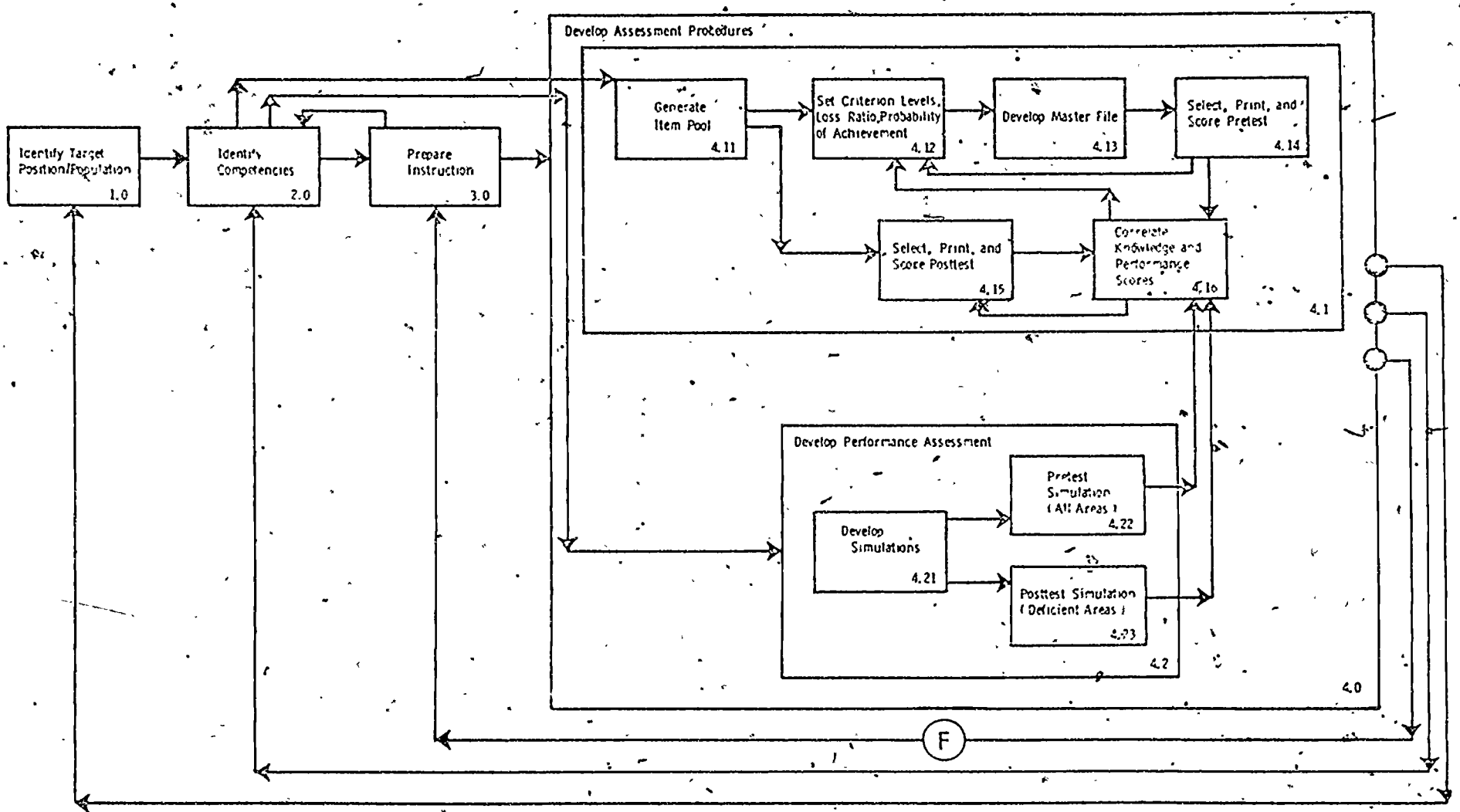
The following discussion focuses on those procedures and instruments which provide objective evidence of competency levels. Figure 5 indicates the steps for developing and modifying procedures for cognitive and performance assessment of competencies. A more detailed explanation and flow chart for the assessment system as implemented may be found in Hendrix (1974).

Insert Figure 5 here

Performance assessment. Performance assessment consists primarily of a series of job tasks, derived from program objectives, performed in simulated settings which approximate field conditions and rated by experts for adequacy. In addition, participants' self-ratings of perceived proficiency levels are compared with observed levels obtained from the simulated tasks. The parameters

Figure 5

Overview of Model Delineating Cognitive and Performance Assessment Components



of performance assessment are outlined briefly in Figure 6. Performance assessment by means of structured observations of participants' actual performance on the job was investigated in the first application of the model but was discarded as not feasible due to high costs.

Insert Figure 6 here

Simulations developed for use in that application of the model were tailored to the specific situations which an administrator would encounter. For example, the SEASIM (Special Education Administration in Monroe City) simulation materials (UCEA, 1973) which are related to program objectives were rewritten to apply to rural and multi-district programs. However, in many cases no materials were available; and the simulations had to be developed by project consultants and staff.

Initial performance assessment (simulations and self-ratings) usually took place at a pre-instruction workshop. Participants were provided with all necessary materials and could complete the assessment in approximately one and one-half days.

Each simulation for the model's first application was rated by five raters: two representatives of the existing special education administration training programs (degree programs) in the state, an experienced local special education director, a regional consultant, and a State Department of Education special education representative. The current president of the state special education administrator's association was always included as one of the practitioners. Raters worked independently of each other, and the identities of the other participants were not disclosed to them. Each simulated task was rated "pass" or "not pass" according to each rater's judgment. The majority opinion (three out of five) determined a participant's score.

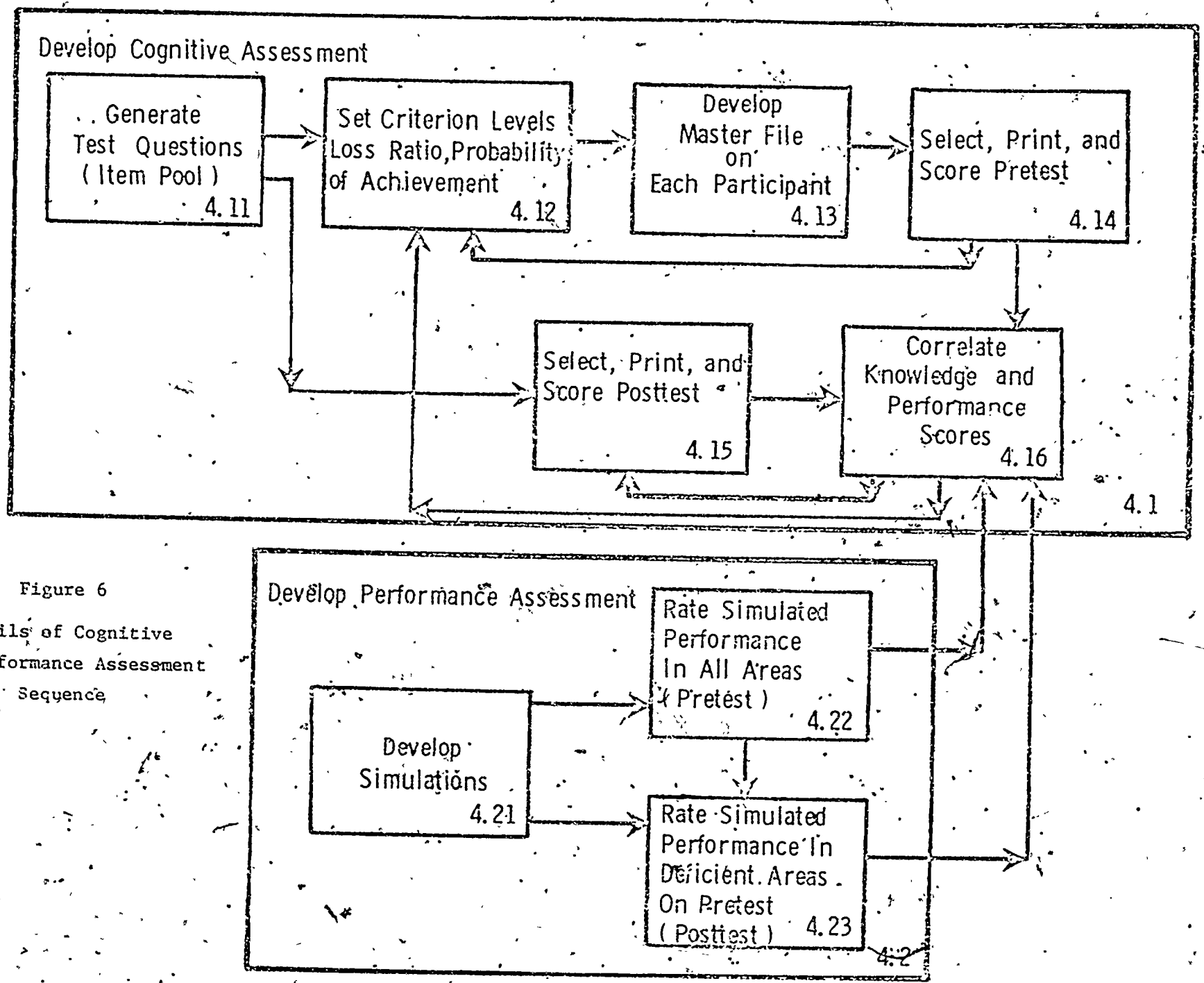


Figure 6

Details of Cognitive and Performance Assessment Sequence

This use of simulations as an assessment tool departs from standard procedures since most training programs follow simulations with immediate instruction to improve performance. Instead, the model uses performance assessment to select areas in which instruction is to be provided. During the field experiences of participants, feedback on simulated performance and further practice on those tasks through course exercises assist in improving performance in deficient areas.

Following instruction, participants are again assessed in those areas in which they were previously deficient to determine the degree of improvement.

Cognitive assessment. Many objectives specify tasks which participants will become able to perform, and demonstration of competency is complete and direct (performance of the task in a setting which simulated actual working conditions). Measurement of these tasks may be considered to be criterion referenced. However, the knowledge (information, grasp of concepts, and ability to apply them appropriately) required to perform job tasks must be inferred, and consequently domain referenced testing is used for assessment of achievement in cognitive portions of the training program objectives.

In domain referenced testing the goal is to create an extensive pool of items which represents, in miniature, the basic characteristics of some important part of the original universe of knowledge domain (Hively, 1974). A domain must be capable of being described very specifically both in terms of content and format. The major advantage of domain referenced testing is that it allows estimates of a participant's "level of functioning" from a small sample of items or the percentage of the total tasks of a specified type which would be answered correctly. The reliability of the test is the accuracy with which the probabilities of correct performance can be estimated.

Validity can be assessed by logical analysis of the domain definition, the item generation scheme, and the individual test items (Millman, 1974).

The domain referred to for the purposes of the model is an educational objective. Consequently, in developing assessment procedures for any objective with a cognitive component, an attempt should be made to generate a large set of test items which represent the pool for that domain. The number of items generated is limited by practical constraints--cost and computer space. For the program developed in the model's first application, 100 test questions for each objective were generated. A domain or objective should be periodically reviewed to determine their continued relevance. For example, a training objective may state that a special education administrator must be cognizant of the requirements of due process, but a change in law or regulation may alter specific due process procedures which the director must follow.

Actual testing of the model under a domain referenced measurement method is done by means of a Bayesian Instructional Testing System (Special Education Administration Training Program, 1974) which is a random selection of those items which measure the objective. The items selected for inclusion in pretests cover all objectives being assessed and are randomly mixed. An estimate is made of the criterion level (e.g. 80 percent correct) which constitutes mastery of each objective (domain), and instruction is provided in those domains where any participant falls below the criterion level. Post tests are developed individually for each participant and consist of items randomly selected from each domain in which instruction has been provided. A separate post test should be developed for each objective to permit each participant to be tested as soon as he completes the course and to allow repeated and different post tests on each objective until the mastery criterion is reached.

The criterion level for mastery is initially set at an arbitrary level, based on the judgment of program staff. After data on domain referenced test performance and on performance assessment are available, scores on the two assessments are compared to determine the level of achievement on the domain referenced test necessary to predict pass ratings on the simulations. That level then becomes the validated mastery criterion for the domain referenced test.

Since participants are tested on only a small fraction of the items which measure achievement of each objective, the reliability of a domain referenced testing procedure is dependent upon the probability that each participant's score on the items to which he/she responds represents the score he/she would attain on the entire (infinite) set of items in that domain. Bayesian statistical procedures (Novick and Lewis, 1974; Novick and Jackson, 1974) are used to prescribe the length of the test a participant should receive and to determine the criterion level which approximates the mastery criterion for the entire domain.

Prior to testing, an arbitrary estimate is made of the probability that participants will achieve at the mastery criterion level, which is used to determine pretest length and the passing score for each objective. Once a test has been administered, information is combined in a straightforward Bayesian procedure using the beta distribution to obtain prior estimates for the first post test. This procedure continues until the estimate of the probability that the participant performs at the mastery level is sufficiently high to consider him/her passed. "Sufficiently high" is determined by the loss ratio for an objective; e.g. a loss ratio of 1.5 indicates that the loss associated with incorrectly passing a participant who has not reached the criterion level is one and one-half times greater than the loss associated

with incorrectly "failing" a student who has reached or exceeded the criterion level. For example, an eight item post test on an objective with a passing score of 6 (75 percent) might be recommended when the mastery criterion is 70 percent and the loss ratio is 1.5 (the score required on the test is higher than the mastery criterion because of the short length of the test and because the loss ratio is more than 1).

All cognitive assessment information is recorded and scored on computer, and the system developed (Bayesian Instructional Test System) for use with the model contains programs and disc storage files which contain the item pool; maintain the status of individual participants in the training project; select, print, and score pre and post tests for each participant; and maintain an ongoing statistical summary of participant progress through the training program. There are nine computer programs for these purposes:

1. Creation of the master item file, including additions, modifications, and deletions.
2. Recording of criterion levels and loss ratios for each objective (for a given group of participants, this information is fixed).
3. Providing initial information on each participant which will be used in later programs (including estimates of the probability that a participant has achieved the criterion level, participant training and experience data, etc.)
4. Determination of the number of items to be included in the pretest and random selection of items from the master file.
5. Determining format and printing a copy of the batch pretest for each participant.
6. Scoring the pretest and updating the files for each participant (including a determination of the need for instruction and for a post test based on a revised achievement estimate).
7. Examination of the participant's status and selection of items for a first post test.

8. Printing a post test and answer sheet for any post test.

9. Scoring post tests, updating the information file on each participant, and generating a new post test for each objective not passed. (A participant may take up to eight post tests per objective.)

Service Delivery Systems

The manner in which the characteristics appear in actual operation can perhaps be most easily understood by listing the cycle of activities included in the model as initially implemented. However, the purpose of the present section is merely to illustrate a special education administrator's activities as a participant in this program, not to indicate that this is the only delivery system for the model. Specific needs of each application will determine the delivery system used. This can be either in-service (continuing education) or pre-service (entry level education). A sequential representation of his participation and the service delivery system are shown as Figure 7.

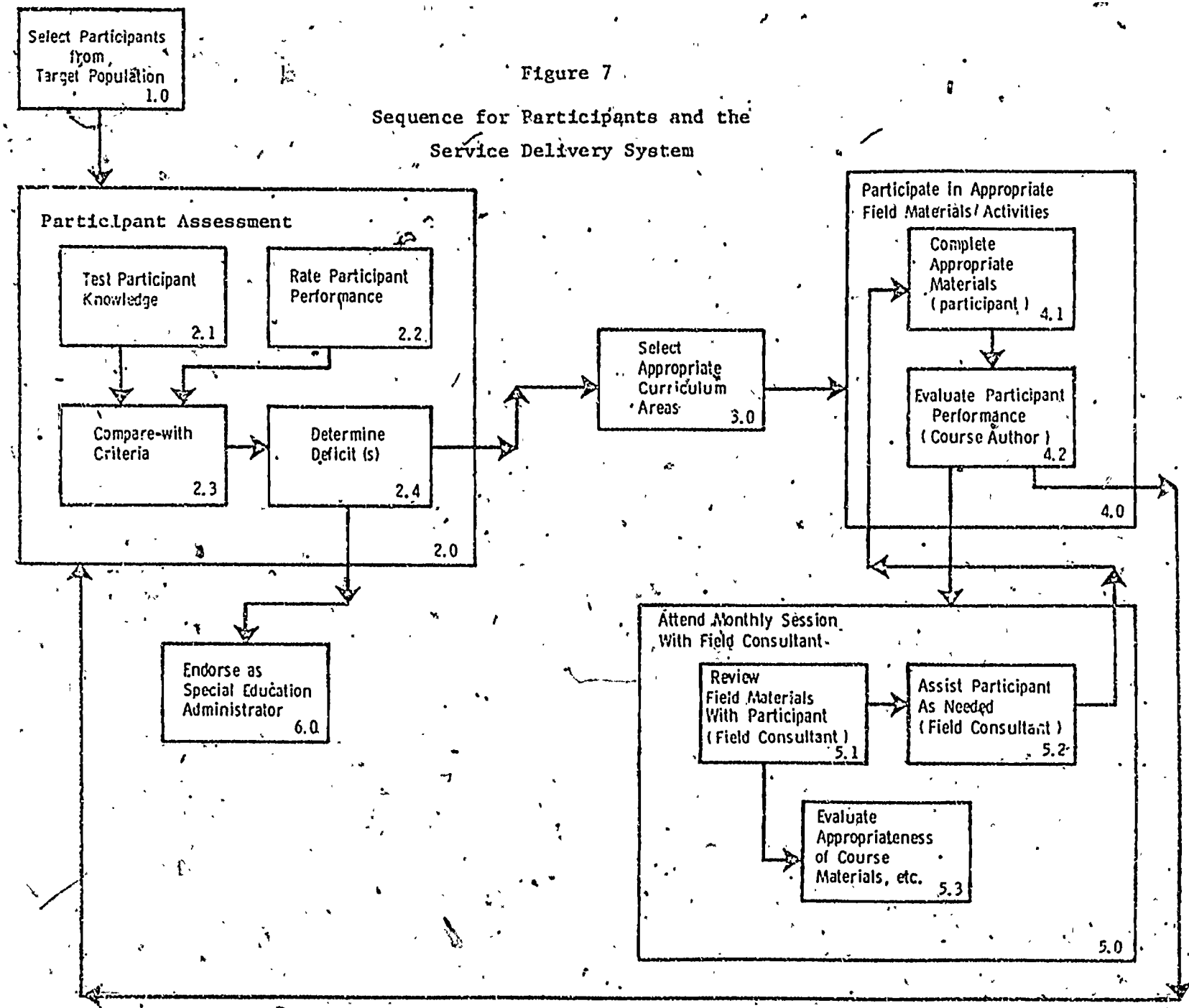
Insert Figure 7 here

Selection. In the illustration Minnesota special education directors were eligible to participate in the program if they indicated interest and met the initial selection criteria. Selection criteria included limited experience as a director of special education (less than three years), little or no formal training in educational administration, and a capacity limit of 25 participants. These criteria were established to maximize immediate impact of the project in its formative phases while in the future, participation may be open to all interested.

Program planning. Following acceptance into the illustrative program, a participant's first activities consisted of an assessment of his individual

Figure 7

Sequence for Participants and the Service Delivery System



needs. First, participants were given a cognitive domain referenced test covering knowledge and application of facts, procedures, and concepts for all objectives in each of the three curriculum areas which had been identified: fiscal management, personnel management, and special education program development. The format of the test was a series of approximately 300 multiple choice, true-false, and other questions in each of the three curriculum areas. If available information, such as results of prior training, indicated that a participant had already mastered an area, the test could be shortened accordingly. Test results were analyzed to determine areas in which participants had or did not have requisite knowledge, using predetermined criteria. Areas of deficit for each participant became his training objectives. Criteria for adequate cognitive levels were established by correlating domain referenced scores with performance assessment results.

In addition to the domain referenced test, assessment included rating of each participant's performance using simulations of tasks necessary to the position and self-reporting of on-the-job performance. Simulations were rated independently by a panel of judges, and the majority opinion became each participant's score. As with the domain referenced test, performance areas were compared with the predetermined criteria, deficits were determined, and the results were used to formulate individual training objectives.

Cognitive pretests were administered via mail and were returned and analyzed prior to the performance assessment. Performance simulations were conducted in a workshop setting. The workshop was not only a convenient vehicle for performance assessment but also provided an opportunity for initial instruction in the objectives for the participants and for program planning with staff. In addition, the workshop provided orientation to the field experiences in which participants were to engage.

Instruction. Each participant's program in the field required completion of course materials appropriate to his/her needs, provided periodic consultant assistance in improving performance, and allowed opportunities for small group interaction on problem-solving exercises.

First, a participant was sent a set of appropriate field materials and activities for each objective in which the pretest showed his/her performance to be below the criterion level. Course materials included presentation of concepts, source materials, and alternative suggestions for methods of implementing the concept. Participants then completed an exercise demonstrating their ability to implement the concept as it applies to their job; in many cases, course exercises were tasks which must be done on the job in any event (such as developing a child study subsystem). Exercises were assessed by authors of the course materials who based their judgments on evidence that a participant had correctly understood the concept and application of the concept was appropriate to a participant's situation. Exercises were rated "acceptable," "incomplete," or "unacceptable," and comments were included. This part of the field experience was conducted by mail.

Course authors' critiques were reported not only to participants but also the participant's field consultant. Field consultants were persons who are expert in a particular curriculum area (e.g. personnel, fiscal, and program development), and who worked in the same geographic area of the state as a group of participants. In many cases field consultants were persons with whom participants were likely to have ongoing communications after the training program was completed. Each field consultant met monthly with a group of participants who were studying in similar curriculum areas. During these day-long meetings, assignments were reviewed and problems were discussed. The primary role of the field consultant was to assist

each participant in maximizing his/her achievement in both cognitive and performance areas, rather than to evaluate a participant's performance. Field consultants did have an evaluative role, but their reporting of problems encountered with instruction provided a valuable source of feedback for course authors and project staff in order to improve instructional materials. Participant evaluations of each instructional package and post test scores were also utilized to determine areas of improvement in the course materials.

Following review with assistance by a field consultant, participants could modify or repeat course activities as needed, and the same procedure--assessment by course authors and review by participant and field consultant--was repeated until adequate performance was attained. This cycle of input from course materials, practice or exercises included as part of the course materials, feedback on adequacy of performance, and assistance in improving performance continued throughout the training program.

Evaluation. After a participant satisfactorily completed instruction in a curriculum area, the assessment process was repeated using post test versions of both the domain referenced test and performance simulation. The post instructional performance assessment given after instruction included items directed only at the areas in which a participant was rated deficient on the pretest.

Certification/credit. In the example, administrative certification was usually circumvented for entry into the position of special education director. It is possible that training offered (i.e. competencies attained) under such a program could be directly applied toward future certification as certification requirements are reviewed. It might also be that competencies certified through a training program could be used to meet continuing education requirements established by the state, local, district, or other agency.

Time Parameters for Developmental Phases

Use of systems models helps to clarify the logical structure of a procedure since they are relatively independent of content. Systems models are also independent of time. However, based upon our experience, it may be useful to add some estimates of the amount of time which should be allowed for development of each component of a training program using the field centered, competency based model.

The amount of time required for initial determination of the population to be trained will vary with the method used and with the extent of documentation of need required by particular funding authorities. Such activities are usually done before a training model is selected. Thus, time estimates for this component are not included here.

However, for development of the remaining components of the model a minimum of one year must be allowed. The amount of staff time and other resources which must be deployed during that year will vary with the extent to which development procedures and content (objectives, item pool for domain referenced testing, and instructional materials) can be used or adapted. Thus, less effort will usually be required to develop a preparation program for a position for which such a program has been developed in another state using the model than would be required to develop a comparable program for a position for which a program has not been previously developed using the model. One might also project that less effort will be required to develop an administrative education program than one for teachers or other direct service providers. The procedures, however, will be applicable in any case.

A one year development period seems necessary for competency identification, due to the inclusion of both identification and validation procedures in the development phase. Given favorable conditions, goal analysis and job

analysis can both be accomplished in 90 days. However, an anthropological field study to validate initially identified competencies requires an entire year; and, if possible, additional time should be allowed for thorough data analysis.

The job analysis and goal analysis provide the training objectives which are necessary input into both the preparation of instruction and development of assessment components. Once objectives are known, course authors can be selected and materials preparation begun. If some use can be made of SEATP materials or if instructional materials for objectives identified as high priority are readily available, instructional preparation for a year's instruction may be done in six months. If instruction is likely to be sequential, some instructional preparation can continue while initial course work is conducted.

The major tasks in developing assessment procedures, if Bayesian Testing System computer programs are used, are preparing an item pool and developing simulated or on-the-job performance assessment procedures. If many items in previously developed item pools are applicable to a proposed education program, the task may be accomplished in eight months. If the entire pool must be developed, then a minimum of a year (after training objectives have been determined) must be allowed. Development of performance assessment procedures also varies with the extent to which existing simulation materials and other tools can be employed. An emphasis on performance ratings rather than the domain referenced test procedure would result in proportionately less time being spent in instrument development (and more in administration of the performance assessment) than is the case for cognitive assessment.

Summary

This field centered, competency based educational model considered in this paper is an ongoing part of a program for the special education administrators in Minnesota. It is believed to have potential for wider application since it represents what the writers believe to be a general model.

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